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summer, and at such seasons the droves of horses and cattle and the numerous aboriginal wild rodents destroy every vestige of vegetation in their efforts to live, the cattle even tearing out the roots of the pampas grass. The existence of an unprotected tree is impossible. Nothing survives save thistles, some grasses and clovers, a few poisonous plants, thorny dwarf acacias and wiry rushes. The extensive introduction of European plants has only added to the flora of the pampas a few species, such as two thistles that are unassailable by cattle. Yet the soil is fertile and trees grow luxuriantly wherever they are protected.

BOTANICAL NOTES.—The odd tree known to the Mexicans by the name of Ocotilla, and to botanists as *Fouquieria splendens*, a native of the Rio Grande plateau region, has been made the subject of chemical studies by Miss Helen C. De S. Abbot, of the Philadelphia College of Pharmacy, the results of which have lately been published in an eight page pamphlet. A new vegetable wax was discovered in the bark, to which the name of Ocotilla wax was given.——Dr. Farlow's paper on the Synchitria of the United States, in the March *Botanical Gazette* is of unusual interest. It contains descriptions of all the species known to exist in the United States, ten in all.——The Botanic garden of Buitenzorg, Java, founded in 1817, consists of ninety-one and a half acres, and contains more than nine thousand species of plants, each represented by two specimens. Connected with the garden is a botanical museum, containing the herbarium, a collection of vegetable products, and the library, with facilities for drawing and photography. All this is in far-off Java! When may we hope for that kind and amount of state help in this country which will enable our botanists to begin the making of botanic gardens worthy of the name?——As showing the tendency in our best universities we note that, according to an item in the *Gardeners' Monthly*, the University of Michigan "has established a chair of forestry in connection with its other branches of education."——The University of Nebraska has made an appropriation of five thousand dollars for procuring apparatus and collections for its department of botany.

ENTOMOLOGY.

REPRODUCTION IN THE HONEY-BEE.—At a late meeting of the Royal Microscopical Society, Mr. Cheshire exhibited and explained four preparations—three of spermatozoa and one of the muscles of the valve of the receptaculum seminis of the queen bee, which he had recently succeeded in dissecting, and of which he gave an interpretation at a previous meeting. The muscles were shown under polarized light with the prisms crossed, so that two sphincters which overlap, and the fibers of which cross, can be dissected. One resolves the polarized beam completely, while the other gives no twist to the plane of polarization, and so remains invisible; but by rotating the stage plate the latter muscle shines out brightly as the former retires into darkness. Mr. Cheshire finds this method of studying muscular layers in insects of great service. The spermatozoa from the queen bee were exhibited in a dense bundle containing hundreds of thousands of individuals arranged parallel in a tortuous line, and it is in this way that they are packed in the spermatheca, which, in a recently fertilized queen, will contain from four to ten millions of them. The second preparation—an extremely beautiful and curious one—presented the spermatozoa (in this case taken from the vesicula seminalis of the drone) in separation from one another. The contents of the "vesicula" being diluted with water upon a warm slide, the spermatozoa, by their spontaneous movements, spread themselves in a perfectly regular and compact single layer, each individual twisting itself finally into a regular figure like two 8's, surrounded by a larger O. Each spermatozoön is not less than 250μ in length. Spermatozoa from the queen wasp was the third object. These spermatozoa, about 200μ in length, are extremely thin, and carry no visible head, although the ends are not equal in diameter. They take the same typical form as those of the bee. Mr. Cheshire states that for insect spermatozoa he prefers Spiller's purple as a stain. In his remarks he called attention to the curious fact that if a drone larva be introduced into a queen's cell while she is passing through the chrysalis condition, the artificial aperture by which the drone larva was introduced, being afterwards carefully closed, the queen will hatch out already fertilized and capable of at once laying eggs which will produce workers. This remarkable fact seems to open up the way for quite a new method of investigating a certain class of insect phenomena.—*English Mechanic.*

LIFE-HISTORIES OF MITES.—At a late meeting of the Royal Microscopical Society, Mr. A. D. Michael read a paper "On the Life-histories of some little-known Tyroglyphidæ." In 1873 Riley published a report on the ravages of the apple-bark louse (*Aspidiotus conchiformis*), and described an acarus which was supposed to destroy that pest, and which he thought might be the *Acarus mali* of Shimer. Riley only describes the female. Mr. Michael has found the acarus in England under the bark of reeds, destroying the reeds, not feeding on any insect, and concludes that it is probably a feeder on various kinds of bark, not on animal life. He has traced the whole life history. The male (previously unknown) presents the exceptional features possessed by the male of *Tyroglyphus carpio*, discovered by Kramer in 1881, and the hypopial nymph has been figured by Canestrini and Fanzago in 1877 under the name of "parasite of an Oribata," but without explanation. Mr. Michael finds in the life history of this hypopus a confirmation of his views that the hypopial stage is not caused by exceptional adverse circumstances, as Mégnin supposes; but is an ordinary provision of nature to insure the distribution of the species, which it is intended to call *Tyroglyphus corticalis.* Mr. Michael also called attention to the prevalence of *Rhizoglyphus robini* on Dutch bulbs imported into England in 1884, and to the destructive nature of that species, and the damage it did to hyacinth, dahlia and Eucharis bulbs, &c., and recommended that imported bulbs should be carefully examined. —*English Mechanic.*

FIREFLY LIGHT.—MM. Aubert and R. Dubois have recently made a number of interesting observations on the light emitted by "pyrophores," or fire-bearing insects of the family Elateres, genus Pyrophorus. These pyrophores have three luminous organs, one situated at the ventral part, and two at the superior part of the prothorax. The last are always visible, and were submitted to the tests. The light was produced by rubbing the insect with a light brush, and was examined by means of an ordinary spectroscope with a prism of very refrangible glass and a micrometer. The spectrum was very fine, continuous, and showing neither brilliant nor dark rays. This peculiarity has already been pointed out by Pasteur and Gernez, who studied the light from a pyrophore belonging to the late Abbé Moigno, editor of *Les Mondes.* The spectrum occupied about seventy-five divisions of the micrometer, and extended on the red side to the middle of the interval which separates the rays A and B of the solar spectrum, and on the blue side a little beyond the ray E. When the intensity of the light varied, its composition changed in a remarkable manner. When the brightness diminished the red and orange disappeared entirely, and the spectrum consists of green, and a little blue and yellow. The green rays lasted longest. The contrary took place when the light grew in brightness, the green appearing first and spectrum extending a little on the blue and a great deal on the red side. The least refrangible rays are, therefore, emitted last. No other luminous source known appears to behave in like manner. The only case which bears a resemblance is that of sulphate of strontium becoming phosphorescent under the action of light at a glowing temperature. As the temperature rises, rays less and less refrangible appear in the spectrum, but at the same time, as Edmond Becquerel has shown, the less refrangible rays disappear. When the light of the organ begins to appear, the central and forward part only of the organ is luminous. It is only when the light is very bright that the periphery of the organ is luminous, and then the red rays are visible. The light was found to give photographic images on a gelatino-bromide plate; the insect being two centimeters from the plate, and the time of exposure reduced from an hour to five minutes. The photographs show that the light of the pyrophore is capable of producing intense chemical effects, if the smallness of the quantity emitted be taken into account. The light also determines the phosphoresence of sulphate of calcium, after an exposure of five minutes; and eosine and azotate of uranium are rendered fluorescent by it.

The foregoing is taken from an exchange; the first spectroscopic research in firefly light was those of Professor C. A. Young, published in this magazine, vol. III, p. 615, 1870.

USE OF AN ADHESIVE FLUID IN JUMPING INSECTS.—Dr. Dewitz has described the use of a sticky fluid by insects in jumping. A Cicada in a closed glass tube is able to jump from the bottom on to the cover, and from one vertical side to the other, turning in the air; the contingency of having to jump on to vertical surfaces, or the under side of horizontal surfaces, occurs also in Nature—viz., in the case of stems and leaves, which are, moreover, smooth, so that claws are ineffectual to support the insect, and sucking-disks would probably not act with sufficient rapidity. Now, the leaping spiders possess a well-developed pedal adhesive apparatus, by the aid of which they can remain attached to the surfaces on which they alight; the glands which secrete the liquid open all over the balls of the feet, and are especially numerous at their bases.

ENTOMOLOGICAL NOTES.—We glean from the *Zoölogical Record* for 1883, such notes as are of general interest.——Klemensiewicz publishes detailed observations on the glands of the skin of caterpillars.——As the respiration of insects, says Langendorf, depends on abdominal movements, it may continue after the removal of the head. The number of respirations is increased by heat. Tobacco-smoke and chloroform lead to intermittent, but more or less rhythmical respiration for a time. The head and prothorax may be removed, and the respiration will continue; and if the abdomen of a dragon-fly is cut to pieces, respiration will continue in them, thus showing that each abdominal segment possesses its own respiratory center.——Osborne finds that in the European *Zaræa fasciata*, the color of the cocoon depends on the food, larvæ fed on strawberry forming dark-brown resinous cocoons, and those fed on honeysuckle forming pale-greenish cocoons. In this saw-fly parthenogenesis is the rule.——H. Müller states that bees in unaccustomed localities are timid, and find honey with difficulty, but rapidly become accustomed to their surroundings, especially under the guidance of comrades. Different bees exhibit a preference for certain flowers over others, but very brilliantly colored flowers are less attractive than those of more subdued colors. The results of a long series of experiments are summed up with the conclusion that blue or violet are the most attractive colors, and bright yellow the least so.——At the suggestion of Darwin, Fabre undertook a series of experiments to test the power of bees to return to their nests when carried to a distance; a considerable number returned safely.——*Ammophila hirsuta*, says Fabre, searches for the larvæ of *Agrotis segetum*, which are detected under the surface of the ground by some apparently unknown sense. The larva is carefully paralyzed in every segment before being buried, which leads the author to conclude that the Ammophila originally preyed on insects more easily paralyzed, and as it gradually attacked larger insects, its instincts enlarged, and became hereditary.——W. F. Kirby finds that hybrids between *Smerinthus ocllatus* and *populi* usually show traces of hermaphroditism, which seems to indicate that hermaphroditism is encouraged by hybridity, and that the usual sterility of hybrids may be due to this cause.

ZOOLOGY.

ANOTHER VORTICELLA WITH TWO CONTRACTILE VESICLES.—In the NATURALIST for August, 1884, the writer described a new infusorian belonging to the genus Vorticella, under the name *Vorticella lockwoodii*, one of the peculiarities of which was the possession of two contractile vesicles, that being the first recorded instance of the occurrence of more than a single pulsating vacuole in any of the numerous species. Now, however, I desire to state that a similar arrangement obtains in the well-known *Vorticella monilata* Tatem, a species originally discovered in English waters, and by no means uncommon on the continent of Europe or in this country. It therefore seems somewhat surprising that the presence of the two vesicles in this widely distributed form should have hitherto eluded observation. The species occurs in this locality in some profusion, a colony recently taken attached to Myriophyllum from my aquarium being formed, by actual count, of two hundred individuals, another of eighty-three, smaller collections not being rare. With these I have been able to positively determine and demonstrate to a friend the presence of two contractile vesicles which, when the vorticella is in the proper position, are distinctly visible without a change of focus. The fact of their presence is of interest since it is a point in the anatomy of these minute creatures not previously noted.—*Dr. Alfred C. Stokes, Trenton, N. J.*

CUVIERIAN ORGANS OF THE COTTON-SPINNER.— Professor F. Jeffrey Bell gives a technical account of this almost unknown British Holothurian, which is of interest as being the only true —that is, aspidochirotous (or with shield-shaped tentacles)— member of the class which is known to occur in British seas. The organ of most importance is that which produces the sticky secretion from which these animals have obtained their name, and which makes them objects of much dread to the Cornish fishermen. The producing or cuvierian organs are described as forming a solid mass which occupies a large portion of the body-